--25. (New) The device according to Claim 24, wherein a second crystallizer is placed downstream from the sieve (5).--

--26. (New) The device according to Claim 24, wherein the plastic material is a polyester.--

--27. (New) The device according to Claim 26, wherein the polyester is polyethylene terephthalate.--

REMARKS

As a result of the foregoing amendment, Claims 1-8 have been cancelled and Claims 9-27 have been added. Accordingly, Claims 9-27 are pending in this application.

Applicants have hereinabove amended the drawings to delete the originally filed figure and substitute therefor a corrected figure (Figure 1). No new matter has been added in Figure 1.

Applicants have also hereinabove amended the specification to more particularly describe the prior art, to add section headings, to add a brief description of the figure and to correct spelling and/or grammatical errors. Further, as several amendments have been made to the specification, Applicants have submitted herewith a substitute specification. Applicants have also attached herewith a copy of the specification as it existed prior to this Preliminary Amendment with the changes made in the substitute specification

shown with brackets and underlines. No new matter has been added in the substitute specification.

As stated above, Applicants have hereinabove amended the claims to delete Claims 1-8 and substitute therefor new Claims 9-27. In particular, Applicants have substituted the new claims for the original claims to provide antecedent basis for several terms and to conform the claims to U.S. patent practice. Applicants have enclosed a fee calculation sheet for the claims which shows that no fee is due. Claims 9-27 are fully supported by the original specification and claims. No new matter has been added in the new claims.

In view of the foregoing, it is submitted that this application is now in condition for examination on the merits and prompt notice of allowance is earnestly solicited.

Respectfully submitted,

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[Procedure And Device For Manufacturing Crystallizable Plastic Material]

PROCEDURE AND DEVICE FOR MANUFACTURING CRYSTALLIZABLE PLASTIC MATERIAL

BACKGROUND OF THE INVENTION

The present invention relates to a procedure for manufacturing crystallizable plastic material, [such as] e.g., polyesters and the like, and in particular [PET] polyethylene terephthalate (PET), [by having the melting] via post-melting phase [be followed by] crystallization and [solid-state] solid-phase post-condensation [phase, as well as to] , and a device for executing the procedure.

[Crystallization] The crystallization and [solid-state] post-condensation in the solid-phase (SSP) of polyesters obtained from a melt, in particular PET (polyethylene terephthalate), is generally known[()]. In this case, the [meltable] melted polyester (melting point 270 °C and [above] higher) is processed into cylindrical pellets, for example, while simultaneously cooled down to room temperature, and serves as an amorphous [parent] starting material for subsequent crystallization and post-condensation to PET. According to EP-A-379684, for example, crystallization takes place in two fluidized beds (combination of [solids-air bed and] boiling [bed] and spouting beds) at temperatures of 140 °C to 180 °C. Crystallization is followed by exposure to impact to dissolve agglomerates.

However, [crystallizing] it is also known that crystallization can take place at a temperature of less than 140 °C [already] and [also executing] solid-state post-condensation can take place at a temperature exceeding 180 °C [is also known] (e.g.,

according to the unpublished CH 02131/92-2[, which was not published as prior art]).

EP-A-822214 describes a procedure in which [polyester] a polymer material is extruded, pelleted and crystallized without cooling the melt to a temperature far below the crystallization [point] temperature. In this case, a temperature of approx. 160 °C to 220 °C is maintained, and crystallization [is to take] takes approx. 5 - 30 minutes. However, WO 97/23543 [already disclosed] discloses this [process] omission of strong cooling off during pelleting. Polyester is [held] kept in a melt at approx. 270 °C, and drips through [an opening] a hole onto a [metal plate heated to] hot (approx. 135 °C) metal plate, where crystallization has already [takes] taken place. [This is then followed by a] A conventional SSP process then follows this for 24 hours at approx. 205 °C. According to [the instruction of US-A-5510454] U.S. Patent No. 5,510,454, the temperature of the plate [onto which the drops fall] that receives the drops can also measure 180 °C.

Also known is a procedure for the simultaneous drying and crystallization of thermoplastics, e.g., PET according to WO94/25239, wherein plastic [filaments] strands to be dried are quenched for at most 1.5 seconds to achieve a surface temperature of at least 100 °C. [As a result of this only] This partial cooling of the plastic[,] only reduces the crystallization [period is to measure at most] time down to approx. 20 seconds at most.

In a device for manufacturing polyamides according to DE-A-19510698, a moving-bed reactor can be evacuated, wherein [an evacuation] a vacuum pump can be provided with a separator for separating dust [out of] from the waste gas. However, solid

foreign substances, dusts and the like are not reliably removed from the plastic material.

[US-3405098] Further, U.S. Patent No. 3,405,098 describes a procedure for preparing linear condensation polyesters for solid phase polymerization, wherein the melt is quickly quenched in order to obtain an essentially amorphous, solid polyester, which is subsequently heated to 150 °C to 200 °C again, in order to obtain a partially crystallized polyester, which is subsequently milled into fine particles, and classified using sieves. The polyester prepared in this [away] way is then subjected to solid-phase polymerization in a fluidized bed.

SUMMARY OF THE INVENTION

[The object] One of the objects of the present invention is to further develop a procedure for manufacturing crystallizable plastic material, [like] such as polyester or PET, in such a way as to achieve a higher reactivity in the SSP process [as the result of] through larger [crystals] crystallites and [an] improved surface crystal structure, and to reliably separate solid foreign substances [form] from the plastic material after crystallization. [Power consumption is to be reduced as well. This is done based on the features in claims 1 or 3.]

Another object of the present invention is to lower power consumption. This is accomplished based upon the features described in the claims.

[The] Another object of the present invention is [also] to provide a suitable device for executing the above procedure.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 shows a schematic view of an embodiment of the present invention.

DETAILED DESCRIPTION OF THE INVENTION

[The subclaims contain preferred] Preferred embodiments of the present invention are described in the claims.

The present invention shall be described in greater detail [below in an embodiment based on a drawing] based upon the embodiment shown in Figure 1. [The sole figure in the drawing shows an elementary diagram.] Figure 1 shows a schematic view of the embodiment.

In particular, PET 1 [passes from] exits a [melting] melt reactor (not shown) [into] and enters a cutter 2 [with] at a temperature of approx. 280 °C while being cooled and solidified.

The amorphous pellets 3 [with] having a temperature of 140 °C to 180 °C [produced] generated in this way then pass to a fluidized bed 4 without [any] further cooling [for a retention time typical for the procedure], and [then] subsequently to a sieve 5, which can [also have a downstream ambient] be followed by a recirculating air sifter if required, in order to separate out dust and other foreign solids.

According to EP-A-379684, the fluidized bed 2 can also [resemble] be a combination of [spouted bed and boiling bed] boiling and spouted beds. If [needed] need be, [additional

crystallization can follow] the sieving process is followed by more crystallization (not shown).

The PET cleaned and crystallized passes in [this way passes in the usual] a conventional manner [into] to a preheater 6[,] or directly [into] to a shaft reactor 7, where the solid phase [recondensation] post-condensation into PET takes place, and only thereafter [is the granulate] are the pellets cooled to room temperature in a cooler 8.